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1A-38 373

Description
Supplied with the patent application

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Concerning a

Disk assembly for a friction clutch or friction brake

The invention concerns a disc assembly for a friction clutch or friction brake involving a collar affixed to a shaft and a radial external ring disc array capable of working in tandem with friction pads or the like, non-rotating, but axially displaceable along the collar.

The ring disc array in such a design is normally outfitted bilaterally with friction pads or the like.

The principal area of application of the invention is disc brakes. The following description is accordingly couched in terms of disc brakes.

Some known disc brakes have discs that can slide axially. Such a disc brake apparatus with a floating disc assembly has certain advantages, especially if the brakes use multiple discs.

In such an apparatus the disc must rotate in tandem with a shaft and transmit braking torque to the shaft. However, if the disc simultaneously has to float axially, it must be connected with the shaft, or with a collar mounted on the shaft, in such a way that it can transmit torque to the shaft or collar while at the same time remaining free to glide with respect to them. For example, the disc may be connected to the shaft or collar by means of a splined shaft link. In normal operating position, i.e., when the brake is not being applied, an undesirable noise called "chattering" may arise between the disc and the shaft or collar.

The purpose of the present invention is to offer a disc assembly of the type described at the outset that does not give rise to a "chattering" noise when the brake is not being applied.

To achieve this purpose, one or more radial springs are positioned between the collar and the ring disc array. The springs press the ring disc array radially against the collar and thus reduce to a minimum any noise arising between the disc array and the collar as the disc array rotates freely.

It is possible to use springs stiff enough so that they are capable of suppressing any noise between the disc array and the collar. The use of a splined shaft link in this connection is by no means excluded; in fact such a link forms part of most of the recommended realizations of the invention. Here as well, the springs are designed in such a way that only a very slight chattering noise or none at all arises between the collar and the disc array.

The invention and certain of its advantageous particulars are explained in greater detail below in several samples of realizations.

Fig. 1 shows an axial cross-section of a disc brake assembly pursuant to the invention, in which other parts of a disk brake that work in tandem with the brake assembly are shown in broken lines;

Fig. 2 shows a three-quarter view of the disk assembly described in Fig. 1;

Fig. 3 shows a three-quarter view of another realization of the invention;

Fig. 4 shows a three-quarter view of yet another realization of the invention.

The automobile disk brake assembly shown in Figs. 1 and 2 involves a collar 1 and a ring disc array 2. At its center, in an annular binder 4, the collar 1 has an opening 3 for a shaft that is not shown. The binder 4 is equipped with boreholes 6 that allow it to be screwed to a flange in the collar. The disc array 2 shows two ring discs 7, spaced apart, that are axially displaceable independently of each other. Each of the ring discs 7 work in tandem with a pair of brake pads 31 and 35 or 32 and 35.

The ring discs 7 do not rotate, but they are axially displaceable along the collar 1 via groups of pins 18 and 28, which are seated, via sliding seats, in boreholes 9 (Fig. 2) drilled into the disk array and the collar.

At least one group 18 of the pins take the form of longitudinally slotted hollow cylinders of spring steel similar to groove pins, and is thus flexible. These spring-like pins 18 are indicated in Fig. 2 by twin (concentric) circles, to distinguish them from the rigid pins 28 with which they alternate in the distribution. The degree of flexibility of the pins 18 is selected so that in normal operating position the disc array is concentric with and orthagonal to the collar, but so that when the brakes are applied, the flexibility of the disc array allows braking torque to be transferred via the rigid pins 28. In order to limit the axial movement of pin groups 18 and 28, side plates 11 are affixed bilaterally to the collar by means of bolts. The rigid pins 28 are needed only in cases of brake applications where very high loads may be experienced. When no such need exists, all the pins can be of the flexible type 18, taking the form of longitudinally slotted hollow cylinders.

In the sample realization illustrated in Fig. 3, leaf springs 14 are used instead of the above-described spring-like pins. These leaf springs have coiled ends 20 that are anchored in domed recesses 21 in the disk array 2'; their mid-sections abut flattened areas 15 on the circumference of the collar 1'. The leaf springs 14 thus press the disc array toward and against the collar along an invariant concentric path. A further variant of the sample realization illustrated in Fig. 3 involves the use of a set of rigid rectangular protrusions 16 across the circumference of the collar 1' instead of rigid cylindrical pins. These rigid protrusions serve as spikes with extensive radially-directed transfer surfaces that accommodate thermal expansion and that engage matching slots 17 in the disc array 2'. These slots are deeper than

the protrusions are high. The protrusions center the disc array with a slight free play that is absorbed by the springs 14, shown in the direction of the circumference, arranged between each pair of protrusions 16.

In the sample realization illustrated in Fig. 4, very similar to the one illustrated in Fig. 3, the leaf springs 14' are anchored and pre-stressed by means of rigid cylindrical pins 38, each of which is in turn gripped by a domed concavity 19 and facing domed convexity in the leaf spring, each concavity being of circular cross-section. These pins 38 transmit some of the rotational forces and some of the braking torque to the leaf springs. The recesses in the collar take the form of flattened areas along a cord. The sample realizations illustrated in Figs. 3 and 4 also provide for side plates to hold the springs and hence the disc array in axial position relative to the collar.

The sample realizations illustrated that employ two (or more) axially mobile discs can be used with fully lined or partially lined disc brakes. The discs may be made of friction material and the parts that work in tandem with them can be made of a [illegible word] material.

In one realization of a partially lined disc brake using a disc assembly pursuant to the invention as illustrated in Fig. 1, two friction pads are normally used, one of which 31 is immobile while the other 32 can be hydraulically pressed against one of the outer sides of a ring disc 7 by means of a piston 33 [illegible word] in a cylinder 34. Moreover, an additional pair of brake cushions 35 is called for that is [illegible word] but parallel to the axis of the brake disc array 2 by means of flexible pins 36 or similar [illegible word]

between each pair of ring disks 7 of a disc array. When the brakes are applied, the ring discs are pressed, via friction cushions 31 and 32, against friction cushions 35 that are normally assigned to each other, so that a braking effect arises at all facing surfaces of the ring discs 7. When the brakes are released, retracting springs that are not shown in the illustration are called for to retract the parts of the brake that must be separated.

Whereas in the preferred sample realizations the disc array and the collar are held together concentrically by means of springs, the disc array can also be held against the collar in such a way that it remains in contact with the collar at one point.

Naturally other types of springs can be employed, so long as they are adequate to the mechanical and thermal stresses of the intended use. Whereas in the preferred sample realizations the ring discs slide along the springs, each ring disc can have a spring of its own that slides in order to permit axial motion at the collar.

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Claims

1. Disc assembly for a friction clutch or friction brake involving a collar affixed to a shaft and a radial external ring disc array capable of working in tandem with friction pads or the like, non-rotating, but axially displaceable along the collar, **characterized by the fact that** one or more springs (18; 14; 14') working in an essentially radial direction are placed between the collar (1; 1') and the ring disc array (2; 2'; 2'').
2. Disc assembly pursuant to Claim 1, **characterized by the fact that** a longitudinally slotted hollow cylindrical pin (18) is used as a spring, one part of which is seated in a boreborehole (9) drilled in the ring disc array (2) and another part of which is seated in a boreborehole (9) drilled in the collar (1).
3. Disc assembly pursuant to Claim 2, **characterized by the fact that** across the circumference of the collar (1) solid cylindrical pins (28) and longitudinally slotted hollow cylindrical pins (18) are arranged in alternation, such that all pins are seated in boreboreholes (9) some of which are drilled in the disc array (2) and some of which are drilled in the collar (1).
4. Disc assembly pursuant to Claim 1, **characterized by the fact that** the disk array (2'; 2") and the collar (1') are held non-rotatably against each other by means of at least one protrusion (16) in the collar or the disc array, which engages a corresponding slot (17) in the disc array or collar.

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5. Disc assembly pursuant to Claim 4, **characterized by the fact that** the spring employed is a leaf spring (14; 14') that is anchored in facing recesses (15, 21) in the collar (1') and in the disc array (2' 2").
6. Disc assembly pursuant to Claim 5, **characterized by the fact that** the concavities (21) are circular in cross-section.
7. Disc assembly pursuant to Claim 5, **characterized by the fact that** a pin (38) is placed between a spring or each spring (14') and the collar (1') or the disc array (2") so as to pre-stress the spring, the pin being gripped by a domed concavity (19) in the disc array or collar and a facing domed convexity in the spring.
8. Disc assembly pursuant to Claims 1 through 7, **characterized by the fact that** side plates (11) are affixed bilaterally to the collar (1; 1') so as to anchor the springs (18; 14; 14') axially to the collar.
9. Disc assembly pursuant to Claims 1 through 8, **characterized by the fact that** the disc array (2; 2'; 2") includes a set of ring discs (7) that are axially displaceable relative to one another.

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